

Responses by Macrobenthic Assemblages to Extensive Beach Restoration at Perdido Key, Florida

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We examined complex responses by macrobenthic assemblages to extensive beach restoration affecting 7 km of open shoreline at Perdido Key, Florida. Two periods of beach restoration activity included beach nourishment and profile nourishment phases, each lasting roughly one year. An optimal impact study design incorporated ten macrobenthic surveys over a three-year period. The physical environment was altered by beach restoration through changes in depth profiles and sediment composition, as well as through sediment dynamics.

Considerable macrobenthic recovery occurred during the study, although recovery remained indeterminate in some places. Sustained macrobenthic impacts at several offshore stations supported the hypothesis that diverse offshore assemblages may be less resilient than contiguous nearshore sandy-beach assemblages. Various macrobenthic responses attributable to beach restoration included: decreased species richness and total density, enhanced fluctuations in those metrics, variation in abundances of indicator taxa, and shifts in macrobenthic assemblage structure. One sustained impact of beach nourishment at some nearshore stations included the development of macrobenthic assemblages characteristic of steep depth profiles. Two sustained negative impacts of beach restoration at offshore stations included one from beach nourishment and another from profile nourishment. Following beach nourishment, the macrobenthic assemblage structure changed markedly across a considerable offshore area in concert with increased silt/clay loading. Moreover, macrobenthic impacts from silt/clay loading were still evident at the end of the study, more than two years after beach nourishment ceased. Macrobenthic populations fluctuated widely from apparent sediment disturbance at the farthest seaward stations, both during and after profile nourishment. Macrobenthic fluctuations continued through the end of the study, although profile nourishment was completed for more than one year prior to that time. This study is important because of its geographical region, its relatively large spatial scale, its long duration, and for its assessment of impacts on both high-energy nearshore and relatively stable offshore benthic habitats.

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